

Prospectus for Synthesis and Assessment Product 4.2

State-of-knowledge of Thresholds of Change that Could Lead to Discontinuities (Sudden Changes) in Some Ecosystems and Climate-Sensitive Resources (4.2)

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Project Goal

Through development of Science and Assessment Product (SAP) 4.2, address and synthesize the present state of scientific understanding regarding thresholds of change that could lead to discontinuities or sudden changes in ecosystems and climate-sensitive resources. The report will develop a conceptual framework within which to discuss abrupt or sudden changes in ecosystems and resources, and will focus on identifying and synthesizing peer-reviewed studies that provide the best available evidence upon which to define circumstances in which sudden or abrupt changes in ecosystems or resources might be expected in response to climate change.



IQA Lead Agency
US Geological Survey

Supporting Agencies
National Oceanographic and Atmospheric Administration
National Science Foundation
US Environmental Protection Agency
Department of Energy
US Department of Agriculture

Background



A primary goal of the Ecosystems research element of the Climate Change Science Program is to enhance understanding of, and the ability to forecast, impacts of future climate change on ecosystems. Increasing focus is being placed on the existence and likelihood of threshold-type behaviors that could result in abrupt or sudden changes in the responses of ecosystems. Such discontinuities in ecosystem behaviors are difficult to predict, and are likely to result in significant changes in human societies that depend on ecosystem goods and services. While the possibility of threshold changes in ecosystems is suggested by current ecological theory and models, and is documented in the paleoecological record, such changes are poorly understood. It is unclear under what circumstances such behaviors will occur in the future in response to climate change, as opposed to more gradual, continuous changes in ecosystems. Improved understanding of the likelihood of sudden changes in ecosystems and natural resources is essential to developing appropriate approaches to manage ecosystems and resources in the face of climate change.



Proposed Content

Key Focus Questions

The questions listed below bound the issues to be addressed during development of SAP 4.2.

1. What specifically is meant by sudden changes or discontinuities in the responses of ecosystems and climate-sensitive resources? How do we recognize such changes? What are appropriate ecological endpoints for measuring such changes? What is an appropriate conceptual framework within which to consider the likelihood of sudden or discontinuous changes in response to future changes in climate? How does our ability to recognize sudden changes in ecosystems and climate-sensitive resources vary with the spatial or temporal scales of observation and analysis?
2. What evidence is available from current ecological theory, ecological modeling studies, or the paleoecological record, that sudden changes in ecosystems and resources are likely in response to future climate change?
3. Are some ecosystems or resources more likely to exhibit sudden changes or threshold-type responses to future climate change? What are the specific processes or factors, physical and biological, which determine whether discontinuous responses are likely to occur in ecosystems or resources in response to future climate change?
4. Are sudden or abrupt changes in the responses of ecosystems or climate-sensitive resources due to future or historical climate change any more or less likely than such responses to other human actions or stressors? If so, what factors are responsible for these differences?
5. If sudden or abrupt changes are likely in ecosystems and climate-sensitive resources in response to climate change, what does this imply about the ability of ecosystems to provide a continuing supply of ecosystem goods and services to meet the needs of humans? What are the likely impacts on human communities and economic systems of discontinuous changes in ecosystems and resources?
6. If abrupt or threshold type changes are likely in ecosystems and natural resources as responses to future climate change, how must we alter our fundamental management models, premises, and practices in order to manage these systems in a sustainable, resilient manner in the face of future climate change?
7. Can we structure monitoring systems, coupled to ecological and other appropriate models, in order to anticipate pending abrupt or threshold changes in ecosystems and natural resources in response to future climate change?
8. What are the major research needs and priorities that will enhance our ability in the future both to detect and forecast abrupt or sudden changes in ecosystems and climate-sensitive resources and to link them to future human-influenced changes in climate?

Process

The final product for SAP 4.2 will be prepared & reviewed in conformance with:

- Guidelines for Producing CCSP Synthesis and Assessment Products
- Requirements of the Information Quality Act (PL 106-554, §515(a)) ("IQA")
- IQA Lead Agency's Information Quality Guidelines
- Requirements of the OMB Final Information Quality Bulletin for Peer Review

Prior to completion of the first draft of SAP 4.2, the lead agency will develop a peer review plan and post it on its website, as part of its Agenda of Peer Review Plans, with a link to the CCSP web site. This plan will specify the peer review process to be followed and solicit nominations for expert peer reviewers

Further steps in process include:

- First draft subjected to expert peer review; peer review report posted on lead agency's web site and linked to CCSP web site
- Second draft released for public comment following CCSP guidelines (minimum 45 day public comment period); summary of public comments posted on CCSP web site
- Third draft submitted to CCSP Interagency Committee for final review and approval, and to National Science and Technology Council (NSTC) for clearance
- Lead agency produces final product and releases in coordination with Climate Change Science Program Office (CCSPO)

Proposed Timeline:

	Due Date	Task
2005	Nov	Draft prospectus completed
	Dec	CCSP review of draft prospectus completed
2006	Jan	Public comment (30 day) on draft prospectus completed
	Feb	Final prospectus cleared & published on CCSP web site
		FACA process for SAP 4.2 completed, FACA-chartered writing team established (lead & contributing authors)
	May	Initial meeting of lead & contributing authors for product; initiate development of product
2007		Peer review plan completed by lead agency
	Jan	Expert review of first draft of product completed
	May	Second draft of product completed
	Jul	Public comment on second draft of product completed
	Sep	Third draft of product completed
2008	Nov	CCSP review of third draft of product completed
	Jan	NSTC approval of final product
	Dec	Final product published on CCSP web site and in hard copy